

REMARKS

In the Office Action, claims 1-10, 12, 35-37 and 39 were rejected. Reconsideration and allowance of all pending claims are requested in view of the arguments herein below.

Rejections Under 35 U.S.C. §112

Claims 12 and 39 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter, which Applicants regard as the invention. The Examiner stated that claims 12 and 39 do not further limit the subject matter of claims 1 and 35, respectively, and more specifically, appear to be in contradiction. The Applicants respectfully traverse these rejections.

The Examiner's focus during examination of claims for compliance with the requirement for definiteness of 35 U.S.C. 112, second paragraph, is whether the claim meets the threshold requirements of clarity and precision, not whether more suitable language or modes of expression are available. *See* M.P.E.P. § 2173.02. Although the Examiner may take exception to the terms used in the claims, the patentee may be his own lexicographer. *Ellipse Corp. v. Ford Motor Co.*, 171 U.S.P.Q. 513 (7th Cir. 1971), *aff'd*, 613 F.2d 775 (7th Cir. 1979), *cert. denied*, 446 U.S. 939 (1980). The Examiner is also reminded not to equate breadth of a claim with indefiniteness. *In re Miller*, 441 F.2d 689, 169 U.S.P.Q 597 (CCPA 1971).

The essential inquiry pertaining to the definiteness requirement is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. *See* M.P.E.P. § 2173.02. As set forth in Section 2173 of the Manual of Patent Examining Procedure, definiteness of claim language must be analyzed, not in a vacuum, but in light of:

- (A) The content of the particular application disclosure;
- (B) The teachings of the prior art; and

(C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

In reviewing a claim for compliance with 35 U.S.C. 112, second paragraph, the Examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent. *See Solomon v. Kimberly-Clark Corp.*, 216 F.3d 1372, 1379, 55 U.S.P.Q.2d 1279, 1283 (Fed. Cir. 2000). Only when a claim remains insolubly ambiguous without a discernible meaning after all reasonable attempts at construction must a court declare it indefinite. *See Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1366, 71 U.S.P.Q.2d 1081, 1089 (Fed. Cir. 2004). Accordingly, a claim term that is not used or defined in the specification is not indefinite if the meaning of the claim term is discernible. *See Bancorp Services, L.L.C. v. Hartford Life Ins. Co.*, 359 F.3d 1367, 1372, 69 U.S.P.Q.2d 1996, 1999-2000 (Fed. Cir. 2004).

First, Applicants submit that the “electrically conductive material that is grounded to electrically isolate one sensor element from the next” recited in claims 12 and 39 sets out and circumscribes the claimed subject matter with a reasonable degree of clarity and particularity. In fact, it appears that the Examiner is confusing claim breadth with indefiniteness. The element of “electrically conductive material that is grounded to electrically isolate one sensor element from the next” is explained in detail on page 15, paragraph 2, lines 6-16, of the application:

Alternatively, a primarily non-conductive substrate could be used for cMUT fabrication where the bottom electrode would be either deposited metal or selectively doped regions under the cMUT. In this case, it may be desirable to ground the regions between each element by selectively doping these regions and electrically grounding them. Another method of grounding the regions between elements that are separated with isolation trenches (as previously described) would be to coat a surface (e.g., the walls) of the

trenches with an electrically conductive material, such as aluminum or an aluminum-silicon alloy, and then connect this metal to ground to electrically isolate one element from the next. Either method would allow stray charges to be conducted to ground rather than to neighboring elements.

In view of the original application, including the passage cited above, the “electrically conductive material that is grounded to electrically isolate one sensor element from the next” can be readily identified and understood by one of ordinary skill in the art. Thus, the “electrically conductive material that is grounded to electrically isolate one sensor element from the next” is not indefinite as suggested by the Examiner.

Secondly, Applicants submit that in view of the original application, including the passage cited above, recitation of the element “electrically conductive material that is grounded to electrically isolate one sensor element from the next” in claims 12 and 39 does further limit the subject matter of claims 1 and 35, respectively, and more specifically, does not appear to contradict each as suggested by the Examiner.

For these reasons among others, the Applicants respectfully request withdrawal of the foregoing rejections under 35 U.S.C. § 112, second paragraphs.

Rejections Under 35 U.S.C. §103

Claims 1-10, 12, 35-37 and 39 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 6,262,946 (hereinafter “Khuri-Yakub”) in view of U.S. Patent 6,669,644 (hereinafter “Miller”) and U.S. Patent 6,051,868 (hereinafter “Watanabe”). Claims 1 and 35 are independent. All of the recited claims are believed to be patentable as cited below.

Independent Claims 1 and 35 and Claims Depending Therefrom

Claim 1 currently recites, *inter alia*, a sensor device that includes a multiplicity of sensor elements arranged at a front surface of a substrate. Each sensor element is in contact with material of the substrate. Barriers reduce the coupling of a form of energy between the sensor elements, each barrier posing an obstacle to the propagation. Claim 1 further recites that *the barriers extend into the material of the substrate but not completely through the substrate material*, and that the barriers and adjoining portions of the substrate are coated with a thin layer of insulating material.

Similarly, claim 35 currently recites, *inter alia*, an ultrasonic transducer device including a multiplicity of ultrasonic transducer elements arranged at a front surface of a substrate. Each transducer element includes a respective group of ultrasonic transducer cells electrically connected together and acoustically coupled to the substrate. A multiplicity of trenches in the substrate material are disposed in areas between the transducer elements, the trenches obstructing the propagation of acoustic wave energy therethrough. Claim 35 further recites that *the trenches extend into the substrate material but not completely through the material*, and that the trenches and adjoining portions of the substrate are coated with a thin layer of insulating material.

The Examiner argued that Khuri-Yakub is believed to teach the claimed sensor device, including a multiplicity of sensor elements arranged on the front surface of a substrate. Additionally, the Examiner also argued that Khuri-Yakub is believed to teach a barrier arranged in the substrate material to reduce the coupling of a form of energy between any of the sensor elements. Further, the Examiner acknowledged that Khuri-Yakub does not teach or suggest a multiplicity of barriers. The Examiner argued that Khuri-Yakub teaches a single barrier as illustrated in FIG. 10.

The secondary references do not obviate the deficiencies of Khuri-Yakub. The Examiner relied upon Miller to teach a sensor device where a plurality of sensor elements

are arranged on a substrate, where the substrate has a plurality of barriers or trenches for reducing coupling energy between sensor elements. The Examiner further argued that Miller is believed to teach a sensor device where a plurality of sensor elements (210) are arranged on a substrate (220). The substrate has a plurality of barriers or trenches (215) for reducing coupling energy between sensor elements.

Applicants have closely considered these passages and, indeed, the Miller patent as a whole. The cited passages from Miller, and the entire reference, do not support the Examiner's position, however. Applicants respectfully submit that the claims, in their current form, require that *barriers or trenches do not extend completely through the substrate material*. As described in the present application, each of the barriers or trenches starts at the front surface of the substrate and has a depth less than a thickness of the substrate as depicted in the embodiment illustrated in FIG. 6. Support for Applicants' arguments may be found, *inter alia*, in the passage at lines 6-16 on page 11 of the application. In addition, in the embodiment illustrated in FIG. 8 of the application, each of the barriers and trenches starts at a rear surface of the substrate and has a depth less than a thickness of the substrate. Further support for this aspect of the claimed arrangement may be found, *inter alia*, in the passage at lines 5-11 on page 13 of the application. Furthermore, each of the barriers and trenches and adjoining portions of the substrate may be coated with a thin layer of insulating material, as discussed, *inter alia*, in the passage at lines 1-7 on page 14 of the application.

On the contrary, as depicted in FIGS. 2-5 of Miller, a plurality of holes (215, 315, 415, 515) are etched through the MUT substrate 220 proximate to each MUT cell 216. More particularly, each via 215 is etched *completely through* the MUT substrate 220, thereby creating voids in the MUT substrate 220, as discussed, *inter alia*, in a passage at col. 3, lines 36-46 of Miller, as has been quoted extensively in the previous responses. Additionally, Applicants also wish to bring to the Examiner's attention that Miller teaches doping each of the vias 215 to be electrically conductive. Each of the electrically

conductive vias 215 is then employed to electrically connect a MUT element 210 to associated circuitry, as discussed, *inter alia*, at col. 3, lines 49-58 of Miller.

In summary, Miller teaches that the plurality of holes (vias 215) that are etched completely through the MUT substrate 220, while the present claims relate to structures in which barriers or trenches are formed such that *each of the barriers or trenches starts at the front surface or the back surface of the substrate and has a depth less than a thickness of the substrate*. Additionally, each of the barriers or trenches is coated with an insulating material. In other words, Applicants respectfully submit that there is simply no similarity between the vias 215, 315, 415, 515 in Miller and the multiplicity of barriers in the claims. For at least this reason, among others, the hypothetical combination of Khuri-Yakub and Miller is improper and cannot be made.

Secondly, the Examiner relied on Watanabe solely for its disclosure of a semiconductor device wherein trenches, used for reducing cross talk, are also coated with silicon oxide or silicon nitride (insulators) for reducing cross talk. Applicants respectfully state that Watanabe relates to a semiconductor device, and more particularly relates to a semiconductor device comprising a high-speed analog circuits connecting to multiple-power supplies and specific structures capable of reducing cross talk originating in these analog circuits. In a complete contrast, Khuri-Yakub relates to capacitive micromachined ultrasonic transducers, and more particularly to transducers and transducer arrays in which the cross talk or cross-coupling is minimized.

Specifically, Watanabe discloses a principle of operation wherein electric potentials of high concentration n-type layers are stabilized at a fixed value by supply of power through electrodes mounted on the these layers in order to prevent cross talk rather than using capacitive micromachined ultrasonic transducer array to minimize the excitation and propagation of plate waves and ultrasonic waves. Moreover, Watanabe discloses the use of trenches to reduce cross-talking only in context of *separating transistors* unlike in context

of *separating transducer arrays* as disclosed by Khuri-Yakub. Applicants respectfully submit that it would be improper to modify the transducer-based system of Khuri-Yakub to include trenches as disclosed by Watanabe, because such a modification would change the principle of operation of Khuri-Yakub. In fact, it would require a substantial redesign of Khuri-Yakub to incorporate trenches, and it would render the transducer-based system of Khuri-Yakub inoperable for its intended purpose.

For the foregoing reasons, among others, Applicants respectfully submit that Khuri-Yakub and Watanabe teach contrastingly different intended purposes and principles of operation, which would change if the cited references were hypothetically combined as suggested by the Examiner. As summarized above, a proposed modification or combination of references is entirely improper and insufficient to support a *prima facie* case of obviousness, where the proposed modification or combination would change the principle of operation of the cited reference or render the cited reference unsatisfactory for its intended purpose. For at least these reasons among others, the hypothetical combination of Khuri-Yakub and Watanabe is improper and cannot be made. Accordingly, the Applicants respectfully request withdrawal of the foregoing rejections and allowance of the corresponding claims.

In addition, the Examiner has not shown the requisite motivation or suggestion to modify or combine the cited references to reach the present claims. The Examiner must provide objective evidence, rather than subjective belief and unknown authority, of the requisite motivation or suggestion to combine or modify the cited references. In *re Lee*, 61 U.S.P.Q.2d. 1430 (Fed. Cir. 2002). In the present rejection, the Examiner combined the cited references based on the *conclusory and subjective statement* that it would have been obvious “to one of ordinary skill in the art to include a multiplicity of barriers between the sensor elements (2) so as to provide for greater reduction of cross-coupling between the multiplicity of sensor elements.” Office Action, page 3, lines 15-18.

Accordingly, Applicants respectfully request the Examiner to produce *objective evidence*

of the requisite motivation or suggestion to combine the cited references, or remove the foregoing rejection under 35 U.S.C. § 103.

Hence, Applicants respectfully submit that the *combination* of the references cannot render obviousness of independent claims 1 and 35 as neither Khuri-Yakub nor Miller nor Watanabe teaches the recitations of independent claims 1 and 35. Accordingly, Applicants respectfully submit that a *prima facie* case of obviousness cannot be supported by the combination.

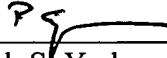
Further, the claims depending directly or indirectly from independent claims 1 and 35 are allowable by virtue of their dependency from an allowable base claim, as well as for the subject matter they separately recite. Thus, it is respectfully requested that the rejection of the claims under 35 U.S.C 103(a) be withdrawn.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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